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(12) UK Patent Application (19) GB (11) 2 339 644 (13) A

(43) Date of A Publication 02.02.2000

(21) Application No 9915439.5

(22) Date of Filing 01.07.1999

(30) Priority Data

(31) 10213431 (32) 14.07.1998 (33) JP

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(51) INT CL⁷

H04M 19/04

(52) UK CL (Edition R)

H4K KBHC

(56) Documents Cited

GB 2301261 A WO 96/02999 A1 DE 029810497 U
DE 019526220 A1
WPI ABSTRACT ACCESSION NO. 98-508105/44

(58) Field of Search

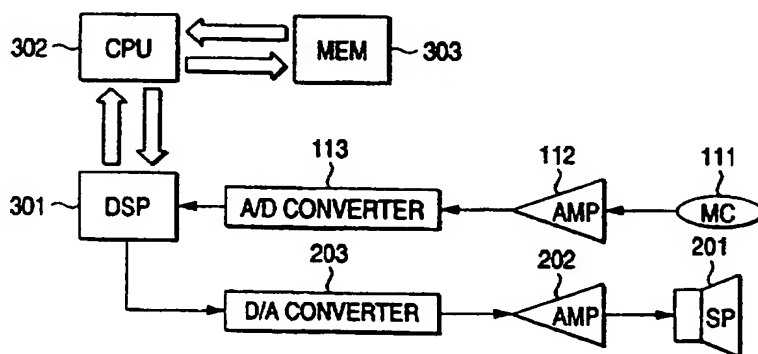
UK CL (Edition Q) H4K KBHC , H4L LECX
INT CL⁶ H04M 19/02 19/04
ONLINE: WPI, PAJ, EPODOC

(54) Abstract Title

P rtable telephone with customizable ringing tone

(57) In a portable telephone set, an input audio signal such as an audio signal is received through a microphone (111), and is then amplified by an amplifier (112). The output of the latter (112) is applied through an analog-to-digital converter (113) to a DSP (301), where it is compressed and stored in a memory (303) with the aid of a CPU (302), or it is stored therein as it is. Hence, an audio signal from outside which is stored in the portable telephone set can be used as a calling sound or alarm sound. Therefore, selection of calling sounds or alarm sounds in the portable telephone set of the invention is wider than in the conventional one.

FIG. 1



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FIG. 1

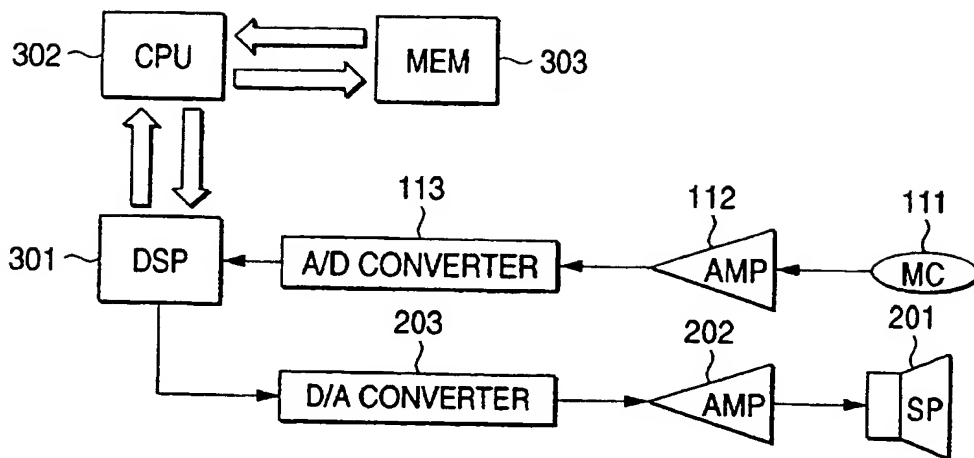


FIG. 2

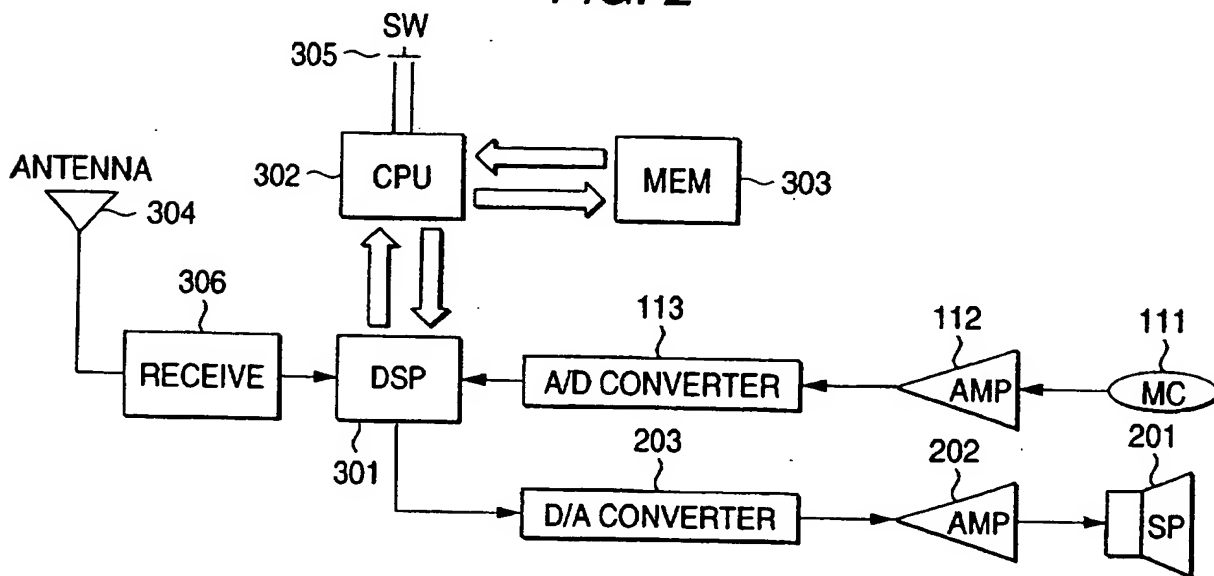
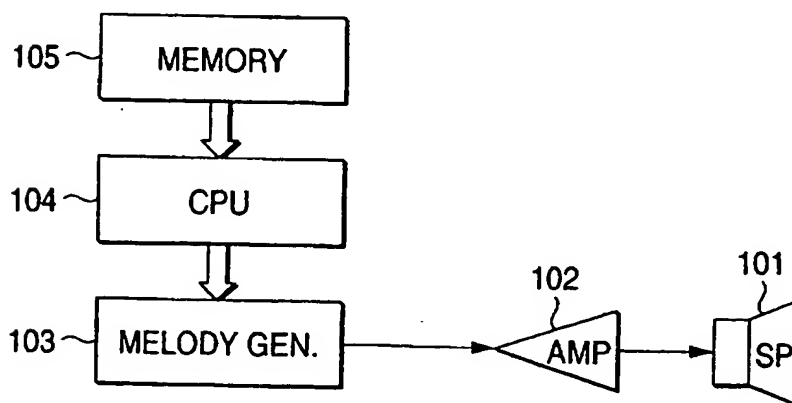


FIG. 3



PORTABLE TELEPHONE SET

This invention relates to a portable telephone set,
5 particularly, to a technique of generating a calling sound or an
alarm sound. More particularly, audio signal is input from a
microphone so as to be used as the calling sound or the alarm sound
of the portable telephone set.

As shown in FIG. 3, in a conventional portable telephone
10 set, its calling sound or alarm sound is outputted as follows:
That is, the calling sound or alarm sound is set up in a melody
generating unit 103 in advance. In response to the arrival of
a calling signal, a CPU 104 instructs the melody generating unit
103 to generate a particular sound, which is outputted through
15 an amplifier 102 and a loud-speaker 101.

In the case where the CPU 104 forms the combination of
particular sounds on the basis of data inputted through a key,
a memory 105 transmits data on the combination of sounds to the
CPU 104, and the latter 104 forms the combination of sounds and
20 instructs the melody generating unit 103.

In the above-described calling sound or alarm sound
generating method, sounds determined inside the portable
telephone set or the combinations of sounds are used, or the
combinations of calling sounds or alarm sounds inputted through
25 the key are used. Therefore, only the particular calling sound
or alarm sound is outputted; that is, selection of the calling
sound or alarm sound is narrow.

Accordingly, an object of the invention is to eliminate the above-described difficulties accompanying a conventional portable telephone set.

5

10 In order to solve the above-described problem, in the invention, for instance an audio signal is inputted through a microphone and stored in the portable telephone set, and the audio sound thus inputted is utilized as a calling sound or alarm sound.

Hence, in addition to a calling sound or alarm sound which
15 has been fixed in a portable telephone set, many kinds of calling sounds or alarm sounds can be produced; that is, selection of a calling sound or alarm sound is widened as much.

Particularly, according to first aspect of the invention, a digital portable telephone set comprises: input means for
20 amplifying an input audio signal which is inputted through a microphone; conversion means for subjecting the input audio signal amplified by the input means to analog-to-digital conversion; compressing means for compressing the input audio signal converted by the conversion means; and memory means for
25 storing the input audio signal which has been compressed by the compressing means; control means for specifying the input audio signal stored, in the case where a input audio signal stored is

used as a calling sound when the portable telephone set receives a calling signal; decompressing means for decompressing the input audio signal which is taken out by the control means; amplifier means for amplifying the input audio signal which has been
5 decompressed by the decompressing means; and notifying means for notifying, as a calling sound, a called party of the input audio signal amplified by the amplifier means.

That is, sounds which can be utilized as calling sounds or alarm sounds are inputted through the microphone and stored
10 to widen the selection of kinds of sound.

Preferably, in the portable telephone, in the case where, when the input audio signal is stored, a plurality of inputs are stored, the control means specifies storing locations.

In the invention, too, sounds which can be utilized as
15 calling sounds or alarm sounds are inputted through the microphone and stored to widen the selection of kinds of sound.

More preferably, in the portable telephone set, the input audio signal thus stored is reproduced, and notifies a called party, as an alarm sound of the telephone set, of the input audio signal
20 thus reproduced.

Similarly as in the case of the calling sound, the selection of kinds of alarm sound is widened.

More preferably, in the portable telephone, an audio signal inputted through the microphone which has been stored and
25 reproduced is used as a calling sound of the telephone set, and the audio signal inputted through the microphone which has been stored and reproduced is also used as an alarm signal of the

telephone set.

Accordingly, the selection of kinds of sound which can be utilized as calling sounds or alarm sounds is widened.

Further, according to the second aspect of the invention,
5 a digital portable telephone set comprises: input means for amplifying an input audio signal which is inputted through a microphone; A/D (analog-to-digital) conversion means for subjecting the input audio signal amplified by the input means to analog-to-digital conversion; memory means for storing the
10 input means converted by the conversion means; control means for specifying the input audio signal stored, in the case where a input audio signal stored is used as a calling sound when the portable telephone set receives a calling signal; D/A conversion means for subjecting to digital-to-analog conversion which is taken out by
15 the control means; amplifier means for amplifying the input audio signal which has been converted by the D/A conversion means; and notifying means for notifying, as a calling sound, a called party of the input audio signal amplified by the amplifier means.

In this invention, too, the selection of kinds of sound
20 which can be utilized as a calling sound or alarm sound is widened.

Preferably, in the case where, when the input audio signal is stored, a plurality of inputs are stored, the control means specifies storing locations.

In the portable telephone set, sounds which can be
25 utilized as calling sound or alarm sounds are inputted through the microphone and stored, to widen the selection of kinds of sound.

More preferably, the input audio signal thus stored is reproduced, and notifies a called party, as an alarm sound of the telephone set, of the input audio signal thus reproduced.

5 With the portable telephone set, similarly as in the case of the calling sounds, the selection of kinds of alarm sound can be widened.

10 More preferably, an audio signal inputted through the microphone which has been stored and reproduced is used as a calling sound of the portable telephone set, and the audio signal inputted through the microphone which has been stored and reproduced is also used as an alarm signal of the telephone set.

With those means, selection of kinds of sound which can be utilized as calling sounds or alarm sounds can be widened.

15 Furthermore, according to third aspect of the invention, a digital portable telephone set comprises: memory means for storing a sound signal of a calling party which is received from the calling party; control means for specifying the audio signal of the calling party thus stored, in the case where the sound signal of the calling party thus stored is used as a calling sound when
20 the portable telephone set receives a calling signal; D/A conversion means for subjecting to digital-to-analog conversion which is taken out by the control means; amplifier means for amplifying the audio signal of the calling party which has been converted by the D/A conversion means; and notifying means for
25 notifying, as a calling sound, the called party of the audio signal of the calling party amplified by the amplifier means.

In the invention, too, selection of kinds of sound which

can be utilized as calling sounds or alarm sounds can be widened.

Preferably, in the portable telephone set, the audio signal of the calling party thus stored is reproduced, and notifies a called party, as an alarm sound of the portable telephone set, of the audio signal thus reproduced.

With the portable telephone set, similarly as in the case of the calling sounds, selection of kinds of alarm sound is widened.

More preferably, the input audio signal thus stored is reproduced, and notifies a called party, as an alarm sound of the telephone set, of the input audio signal thus reproduced.

With the portable telephone set, similarly as in the case of the calling sounds, the selection of kinds of alarm sound can be widened.

15 BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a block diagram for a description of the arrangement of an input/output system for generation of a calling sound and an alarm sound in an example of a portable telephone set, which constitutes a first embodiment of the invention;

20 FIG. 2 is a block diagram for a description of the arrangement of an input/output system for generation of a calling sound and an alarm sound in another example of the portable telephone set, which constitutes a second embodiment of the invention; and

25 FIG. 3 is a block diagram for a description of the generation of a calling sound and an alarm sound in a conventional portable telephone set.

Preferred embodiments of the invention will be described with reference to FIGS. 1 and 2.

First Embodiment

5 An example of a portable telephone set, which constitutes a first embodiment of the invention, is as shown in FIG. 1. FIG. 1 shows the arrangement of an input/output system for generation of a calling sound and an alarm sound in the first embodiment.

10 In FIG. 1, an input signal such as an audio signal is received by a microphone 111, and is then amplified by an amplifier 112. The output of the latter 112 is subjected to A/D (analog-to-digital) conversion by an analog-to-digital converter 113, and the output of the latter 113 is applied to a DSP (digital signal processor) 301 where it is compressed or converted. The
15 output signal of the DSP 301 is stored through a CPU 302 in a memory 303. Hence, the audio signal from outside which has been stored in the portable telephone set can be used as a calling sound or alarm sound. Thus, in the invention, selection of the calling sound or alarm sound is much wider than in the prior art.

20 That is, the audio signal stored in the memory 303 which is employed as the calling sound is determined in advance. In response to the calling, the CPU 302 provides an instruction so that the audio signal thus determined is read out of the memory 303. If the signal is compressed, then it is decompressed by the
25 DSP 301. If the signal is not compressed, then it is converted, as it is, by a D/A (digital-to-analog) converter 203 into an analog signal. The analog signal thus obtained is amplified by an

amplifier 202. The output of the latter 202 is outputted as a calling sound by a loud-speaker 201.

In the case where it is used as an alarm sound, a predetermined time is set as in the case of an alarm clock. When
5 the predetermined time occurs, the CPU 302 reads the predetermined audio signal out of the memory 303. If the signal has been compressed, then it is decompressed (restored). If it has been not compressed, then it is converted into an analog signal by the digital-to-analog converter 203. The analog signal thus
10 obtained is amplified by the amplifier 202, and the output of the latter 202 is outputted as an alarm sound through the loud-speaker.

In the embodiment, the audio signal is compressed or decompressed by the DSP (digital signal processor) 301; however, in place of the DSP 301, the A/D converter 113, the D/A converter
15 203, and the CPU 302 may be directly coupled to one another.

Second Embodiment

FIG. 2 shows another example of the portable telephone set, which constitutes a second embodiment of the invention. More specifically, FIG. 2 shows the arrangement of an input/output
20 system for generation of a calling signal and an alarm signal.

The second embodiment (FIG. 2) is obtained by adding an antenna 304, a receiving section 306, and a switch 305 to the first embodiment (FIG. 1).

In FIG. 2, in order to store the audio signal in the memory
25 303 which is received from the calling party through the antenna 304, during the call the switch 305 is operated which functions to instruct the CPU to effect a memory mode to store an audio signal

from the calling party.

The audio signal from the calling party is received through the antenna 304 by the receiving section 306, and the CPU 302 operates to store the audio signal thus received in the memory 303 through the DSP 301.

Thereafter, similarly as in the case where an audio signal received through the microphone is recorded, the audio signal, which is used as a calling sound and has been stored in the memory 303, is specified. Hence, upon arrival of a calling signal, it is converted into an analog signal by the D/A converter 203, and the analog signal is amplified by the amplifier 202 and outputted as a calling sound by means of the loud-speaker 201. A method of using it as an alarm sound, is equal to the method in the first embodiment.

As was described above, in the portable telephone set of the invention, an input audio signal which can be utilized as a calling sound or alarm sound is obtained through the microphone, and is used as a calling sound or alarm sound. While, in the conventional portable telephone set, only a particular calling sound or alarm sound, or a particular combination of sounds which are calling sounds or melody sounds are employed, in the portable telephone set of the invention all input signals such as audio signals inputted through the microphone can be used as calling sounds or alarm sounds; and therefore selection of calling sounds or alarm sounds is wide.

In the portable telephone set which is so designed that the audio signal of the calling party is stored, the audio signal

- 10 -

of the calling party can be used as a calling sound or alarm sound of the telephone set.

CLAIMS

1. A digital portable telephone set comprising:
input means for amplifying an input audio signal which
is inputted through a microphone;

5 conversion means for subjecting said input audio signal
amplified by said input means to analog-to-digital conversion;
compressing means for compressing said input audio signal
converted by said conversion means;

memory means for storing said input audio signal which
10 has been compressed by said compressing means;

control means for specifying said input audio signal
stored, in the case where said input audio signal stored is used
as a calling sound when said portable telephone set receives a
calling signal;

15 decompressing means for decompressing said input audio
signal which is taken out by said control means;

amplifier means for amplifying said input audio signal
which has been decompressed by said decompressing means; and

notifying means for notifying, as a calling sound, a
20 called party of said input audio signal amplified by said amplifier
means.

2. A portable telephone set as claimed in claim 1,
wherein said control means specifies storing locations, in the
25 case where a plurality of inputs of said input audio signal are
stored.

3. A portable telephone set as claimed in claims 1 or 2, wherein said input audio signal thus stored is reproduced, and notifies a called party, as an alarm sound of said telephone set, of said input audio signal thus reproduced.

5

4. A portable telephone set as claimed in claims 2 and 3, wherein an audio signal inputted through said microphone which has been stored and reproduced is used as a calling sound of said telephone set, and said audio signal inputted through said
10 microphone which has been stored and reproduced is also used as an alarm signal of said telephone set.

5. A digital portable telephone set comprising:
input means for amplifying an input audio signal which
15 is inputted through a microphone;

A/D (analog-to-digital) conversion means for subjecting said input audio signal amplified by said input means to analog-to-digital conversion;

memory means for storing said input means converted by
20 said conversion means;

control means for specifying said input audio signal stored, in the case where a input audio signal stored is used as a calling sound when said portable telephone set receives a calling signal;

25 D/A conversion means for subjecting to digital-to-analog conversion which is taken out by said control means;

amplifier means for amplifying said input audio signal

which has been converted by said D/A conversion means; and
notifying means for notifying, as a calling sound, a
called party of said input audio signal amplified by said amplifier
means.

5

6. A portable telephone set as claimed in claim 5,
wherein said control means specifies storing locations, in the
case where a plurality of inputs of said input audio signal are
stored.

10

7. A portable telephone set as claimed in claim 5 or 6,
wherein said input audio signal thus stored is reproduced, and
notifies a called party, as an alarm sound of said telephone set,
of said input audio signal thus reproduced.

15

8. A portable telephone set as claimed in claim 6 or 7,
wherein an audio signal inputted through said microphone which
has been stored and reproduced is used as a calling sound of said
portable telephone set, and said audio signal inputted through
20 said microphone which has been stored and reproduced is used as
an alarm signal of said telephone set, .

9. A digital portable telephone set comprising:
memory means for storing a sound signal which is received
25 from a calling party;

control means for specifying said audio signal from said
calling party thus stored, in the case where said sound signal

thus stored is used as a calling sound when said portable telephone set receives a calling signal;

D/A conversion means for subjecting to digital-to-analog conversion which is taken out by said control means;

5 amplifier means for amplifying said audio signal from said calling party which has been converted by said D/A conversion means; and

notifying means for notifying, as a calling sound, said called party of said audio signal of said calling party amplified
10 by said amplifier means.

10. A portable telephone set as claimed in claim 9, wherein said audio signal of said calling party thus stored is reproduced, and notifies a called party, as an alarm sound of said
15 portable telephone set, of said audio signal thus reproduced.

11. A portable telephone set as claimed in claim 9 or 10, wherein said audio signal from said calling party which has been stored and reproduced is used as a calling sound of said
20 portable telephone set, and said audio signal of said calling party which has been stored and reproduced is used as an alarm signal of said portable telephone set.

12. A portable telephone substantially as described with
25 reference to Figures 1 and 2 of the accompanying drawings.